Research Report 1448

Cost and Perceived Effectiveness of a Remotely Conducted Command Post Exercise

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Boise Scientific Coordination Office
Training Research Laboratory

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The purpose of the present research was to determine the feasibility of conducting a remote command post exercise (CPX) while identifying its relative cost and equipment requirements for long-distance communications. Elements of the 116th Armored Cavalry Regiment (ACR) of the Idaho Army National Guard traveled to Gowen Field, Idaho, to participate in a 3-day, simulated remote CPX. Regimental and Squadron Command Posts (CPs) were dispersed geographically to different locations in and around Gowen Field to simulate the (Continued)

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20. Abstract (Continued)

long-distance, distributed environment of an actual remote CPX wherein participating units would intercommunicate from their respective home stations. The exercise was driven by the Computer Assisted Map Maneuver Simulation (CAMMS), the battlefield simulator, which supported the interaction of players (i.e., the 116th ACR), controllers (i.e., the 75th Maneuver Area Command (75th MAC) and Maneuver Training Command (MTC)), and the computer support system itself, which furnished "real-time" feedback on battle status. Although the conclusions technically pertain only to the conditions under which the present CAMMS-driven CPX was conducted, they suggest that a significant savings could be achieved in the future by applying the concept of remote exercise delivery. Savings will be a function of how much travel and per diem costs can be avoided through the use of long-distance communications equipment such as that used here. These savings can be achieved under a remote scenario without having to modify basic exercise materials or encounter participant resistance to implementation. This information should assist the 75th MAC in its conceptual development of a Battle Projection Center capable of driving multiple, remote exercises simultaneously from a centralized location.

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FOREWORD

This report examines the feasibility of conducting a remote command post exercise (CPX), derives relative cost data for standard, simulated remote, and actual remote CPXs, and identifies equipment capable of supporting the long-distance communication requirements of later remotely conducted exercises. Results suggest that future applications of remote delivery concepts to the CPX environment could reduce costs without adversely affecting performance.

The project was conducted by the U.S. Army Research Institute's Boise Scientific Coordination Office (ARI-Boise SCO) in the form of technical advisory service requested by the National Guard Bureau (NGB) and the Idaho Army National Guard (IDARNG) under a 12 June 1985 Memorandum of Understanding. The mission of ARI-Boise SCO is to improve the effectiveness and efficiency of Reserve Component training through the testing and application of training technology. The research task supporting this mission is entitled "Application of Technology to Meet Reserve Component Training Needs" and is organized under the "Maintain the Force" program area. Project results have been presented to the Chief, Training Support Branch, NGB, the Assistant Adjutant General of Idaho, and staff from 5th Army Headquarters for use by the 75th U.S. Maneuver Area Command (MAC) in planning for the creation of a Battle Projection Center.

EDGAR M. JOHNSON
Technical Director

COST AND PERCEIVED EFFECTIVENESS OF A REMOTELY CONDUCTED COMMAND POST EXERCISE

EXECUTIVE SUMMARY

Requirement:

Determine the feasibility of conducting a remote command post exercise (CPX) while identifying its relative cost and requirements for long-distance communications equipment.

Procedure:

Elements of the 116th Armored Cavalry Regiment (ACR) of the Idaho Army National Guard traveled to Gowen Field, Idaho, to participate in a 3-day, simulated remote CPX. Regimental and Squadron Command Posts (CPs) were dispersed geographically to different locations in and around Gowen Field to simulate the long-distance, distributed environment of an actual remote CPX wherein participating units would intercommunicate from their respective home stations.

The exercise was driven by the Computer Assisted Map Maneuver Simulation (CAMMS), the battlefield simulator, which supported the interaction of players (i.e., the 116th ACR), controllers (i.e., the 75th Maneuver Area Command (75th MAC) and Maneuver Training Command (MTC)), and the computer support system itself, which furnished "real-time" feedback on battle status. During the exercise, units communicated over commercial telephones, fitted with external speakers and microphones, rather than via tactical FM radios. In addition, slow-scan TV transceivers and facsimile machines were used to transmit graphic and textual information, thereby simulating two-way, face-to-face, and radio teletype communication. Both TV and facsimile transmissions were sent over standard telephone lines. After the exercise, players were asked via questionnaire about the effect of communications equipment on their job performance and the training benefit received from the exercise. Cost figures were also derived to determine the relative costs of three CPX delivery methods, i.e., standard, simulated remote, and actual remote delivery.

Findings:

Analyses of questionnaire responses, cost data, and the exercise after-action report revealed that (a) the simulated remote CPX was conducted without a perceived loss in job performance or training benefits, (b) a remotely conducted exercise can cost less than one conducted in the standard fashion, and (c) with only minor modifications, off-the-shelf commercial equipment can provide the long-distance communication capabilities required for remote delivery.

Utilization of Findings:

Although these conclusions technically pertain only to the conditions under which the present CAMMS-driven CPX was conducted, they suggest that a significant savings could be achieved in the future by applying the concept of remote exercise delivery. Savings will be a function of how much travel and per diem costs can be avoided through the use of long-distance communications equipment such as that used here. These savings can be achieved under a remote scenario without having to modify basic exercise materials or encounter participant resistance to implementation. This information should assist the 75th MAC in its conceptual development of a Battle Projection Center capable of driving multiple, remote exercises simultaneously from a centralized location.

COST AND PERCEIVED EFFECTIVENESS OF A REMOTELY CONDUCTED COMMAND POST EXERCISE

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COST AND PERCEIVED EFFECTIVENESS OF A REMOTELY CONDUCTED COMMAND POST EXERCISE

BACKGROUND

During the period 8-10 August 1986, organic and support elements of the 116th Armored Cavalry Regiment (ACR) of the Idaho Army National Guard participated in a command post exercise (CPX) conducted by the 75th Maneuver Area Command (MAC). Two hundred and ninety-six soldiers from Idaho, Oregon, Mississippi, Missouri, and Texas traveled to Gowen Field, Idaho, to participate.

Command Post Exercises, in general, are designed to train subordinate commanders and staffs to function effectively as teams in the preparation and execution of tactical battle plans and in the establishment and use of communications (Field Manual 25-4). They also provide experience in planning and conducting combat support and combat service support operations that are otherwise difficult to practice.

During the present CPX, the 116th ACR conducted a simulated raid to destroy an enemy supply base. The exercise objective was to provide training on how to conduct forward passage of lines, penetration and raid of enemy positions, withdrawal and rearward passage of lines, and subsequent rear area security operations.

The exercise was driven by the Computer Assisted Map Maneuver Simulation (CAMMS). As the battlefield simulator, CAMMS supported interaction among players, controllers, and the computer support system during the exercise. The players, i.e., 242 members of the 116th ACR, planned for and fought the simulated battle from a command post (CP) environment, as though they were in actual combat. The controllers, i.e., 54 members of the 75th MAC and Maneuver Training Command (MTC), prepared and supervised the exercise. They acted as the next higher, lower, and adjacent headquarters, interfaced with the computer support system via terminals located at each battleboard (i.e., map board) site, and furnished feedback to players on the basis of "real-time" battle progress reports generated by the computer support system. These reports included changes in personnel, equipment, ammunition, and supplies resulting from commanders' battlefield analyses, tactics, and use of resources (Graphic Training Aid 71-2-2).

Besides conducting the present CPX, the 75th MAC is a U.S. Army Reserve unit with 512 assigned members responsible for both writing and conducting CPXs for brigade-size or larger Reserve Component units located in the western two-thirds of the U.S. (Annual Report and Historical Supplement of the 75th MAC, 1985). Because of heavy demands from the field for CPX support, the 75th MAC has begun the conceptual development of a Battle Projection Center. This Center will be capable of driving multiple, remotely conducted exercises simultaneously from a centralized location through the use of long-distance communication technology and state-of-the-art simulation techniques. These remotely conducted exercises should reduce time and travel costs associated with current on-site exercises without compromising training objectives or increasing force structure. Empirical data to support this notion, however, are lacking.

The purpose of the present CPX, therefore, was twofold. For the the controllers and players, the purpose was to accomplish the specified training objectives. For purposes of this research, it was to determine feasibility as well as cost of conducting remote exercises, wherein geographically dispersed units must intercommunicate from their home stations through the use of special long-distance communications equipment. Resulting feasibility and cost information will assist the 75th MAC in further development of its Battle Projection Center concept.

APPROACH

Upon arriving at Gowen Field, units were separated geographically in order to simulate an actual remote CPX scenario. The Regimental CP was set up at the Simplot/Micron Technology Center on the campus of Boise State University while the three Squadron CPs and the Corps CP were situated at dispersed locations within the confines of Gowen Field. Battleboards and CAMMS computer terminals were co-located at the Gowen Field Armory.

During the exercise, units were required to communicate over commercial telephones, fitted with external speakers and microphones, rather than over tactical FM radios. In addition, units were provided with slow-scan (i.e., freeze-frame) TV transceivers1 and facsimile (FAX) machines to use in simulating two-way, face-to-face and radio Teletype communications. One TV transceiver was set up at each of the three Squadron CPs while three transceivers were placed at the Regimental CP to allow continuous monitoring of each Squadron's movement and location on the simulated battlefield. Each CP also was provided with a FAX machine. Television and FAX transmissions of textual and graphic information were sent over standard, voice-grade, commercial telephone lines. (See Appendix A for further description of the equipment).

After completing the exercise, players were asked via self-administered questionnaire (distributed when the exercise began) for comments about their job performance and the adequacy of the special communications equipment. In addition, members from the U.S. Army Research Institute's Boise Scientific Coordination Office (ARI-Boise SCO) observed the entire exercise to help identify any benefits or problems associated with equipment usage.

Cost figures were derived for both the present simulated remote CPX and exactly the same CPX conducted in the standard fashion, for which participants would travel to a single garrison (armory or training center) location. The estimated cost of an actual remote CPX also was calculated to determine the cost of replicating the same CAMMS-driven exercise with participants remaining at their home stations.

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1 The specific slow-scan TV equipment was selected because of its particular capabilities, relative low cost, easy of use, and because it could be leased. Other makes of slow-scan TV equipment or any of several commercially available, computer-based, video creation systems are also capable of doing about the same job at a similar cost.

RESULTS

Feasibility

Questionnaire Responses. To determine the feasibility of future CPXs, players were asked to respond to questions about whether use of the special communications equipment affected their job performance and the training benefit they received from the current exercise relative to that received from past CPXs. To determine whether future efforts to implement remote CPXs are likely to meet with resistance, players were also asked which kind of CPX, remote or standard, they would prefer to participate in next time.

Of 242 questionnaires distributed at the start of the exercise, 108 (45%) were returned at the end. Responses revealed that (a) 27 (25%) participants had no prior CPX experience, and therefore, could not answer questions pertaining to present vs past CPX performance, and (b) 23 (21%) had no contact with the special communications equipment, and therefore, could not answer questions pertaining to its use. Thus, of the 108 questionnaires returned, 58 (54%) were analyzed further and constitute the bases for the following summary statements (see Appendix B for more detail).

Respondents had completed an average of 2 years in the Active Army and 15 years in the ARNG, with 10 of these years spent in the 116th ACR. All had participated in at least one previous CPX, 53% in at least five CPXs, 40% in at least five CPXs as part of the 116th ACR, and 74% had participated in the most recent CPX conducted by the 116th ACR in March of 1985.

On questions pertaining to job performance and training, 55% of the respondents indicated having no difficulty performing their jobs with the special communications equipment provided. The other 45% expressed some difficulty, with 89% of these implicating the telephones as the primary cause. Exactly half of the respondents perceived the communications equipment as benefiting their job performance while 54% thought the equipment benefitted their training.

On questions pertaining to use of specific equipment items, 90% of the respondents who worked with the slow-scan TV said their jobs were easier to perform with the TV than with the usual means of transmitting graphic and textual information (e.g., map overlays, messengers, etc.). Eighty-nine percent of these attributed ease of performance to the timeliness and accuracy of the information provided, and 90% felt slow-scan TV to be a reasonable substitute for face-to-face communication.

Responses regarding the FAX machines and telephones were less positive. Sixty-seven percent of the respondents who worked with the FAX machines, in place of radio Teletype, said their jobs were easier to perform as a result. The FAX machines were judged to be faster and easier to use than radio Teletype, although some concern was expressed about their reliability. Roughly half (51%) of those working with the telephones, as substitutes for FM radios, said their jobs were easier to perform with the former.

Fifty-four percent of the soldiers sampled thought they could have benefitted from more training on the equipment before the exercise started. Adequate training on any new communications equipment, therefore, should be an important consideration for the future conduct of remote CPXs.

Lastly, 75% of the soldiers sampled said that they would prefer to participate in a remotely conducted CPX next time, rather than in one conducted in the standard fashion. Comments made to ARI-Boise SCO members during the exercise suggest that avoidance of travel is probably the main reason for this preference.

After-Action Report. In support of the generally positive self-assessment responses obtained from players, the after-action evaluation report filed by the Exercise Director of the 75th MAC (the controllers), stated "the communications equipment and personnel training for use of the equipment in the exercise presented a challenge that most participants met admirably." This report also stated "the training objectives were met with the exception of the conduct of rear area security. This was planned for, although time did not permit its execution."

Cost

Separate analyses were performed to determine the costs of a standard, simulated remote, and actual remote CPX. While these data, shown below, do not reflect "hidden costs" such as those for electricity, military transportation, and base operations support, they were derived under an identical set of assumptions to ensure a common baseline from which relative cost statements could be made about the three CPX delivery methods of interest.

Standard CPX Cost. Because units actually traveled to Gowen Field to participate in the simulated remote CPX, it was possible to calculate the cost of the exercise as if it had been conducted in the standard fashion (i.e., with all units gathering at a single garrison location). Total cost was $182,388, broken out as shown below in Table 1.

Table 1. Standard CPX costs.

Category	Amount ($)
Pay and Allowances	78,609
Per Diem	35,028
Travel	68,751
Total	182,388

Pay and allowances were calculated under the assumption that all soldiers were in a Full-Time Training Duty (FTTD) pay category in which each receives one day of pay and allowances for each day of training or travel, as well as per diem, based on location and distance from home station. Per diem was calculated at the rate of $30.10 per day for players

(government quarters available, government meals not available) and $69 per day for controllers (government quarters and meals not available), excluding payment for any advance and rear detachment days.

Travel cost figures were provided by the Idaho military transportation office. They reflect the cost of traveling by privately owned vehicles (if distance exceeded 50 miles) and commercial air, with group discounts included where applicable. Appendix C contains a detailed breakdown, in spreadsheet format, of the costs incurred by each participating unit.

Simulated Remote CPX Cost. Total cost of the simulated remote exercise was $207,930. This total includes the same costs for pay and allowances, per diem, and travel listed above for the standard CPX plus $25,542 incurred to lease the communications equipment. Because of contract restrictions, equipment had to be leased for a minimum period of from 30 to 90 days, depending on the specific item, even though the equipment was only used for the present 3-day exercise. Table 2 shows a break down of these costs by item and quantity.

Table 2. Simulated remote CPX costs.

Item		Costs ($)
Pay and Allowances		78,609
Per Diem		35,028
Travel		68,751
Subtotal (personnel)		182,388
	Qty	Lease Costs ($)
TV Transceivers	6	21,314
FAX Machines	5	608
Telephones/ext speakers	23	1,700
Addl Telephone Lines	12	1,200
Telephone Man (80 hrs @ $9 per hr)	1	720
Cameras	4	No cost*
Monitors	6	No cost*
Subtotal (equipment)		25,542
Total		207,930

* Furnished by Boise State University

Actual Remote CPX Cost. The cost of an actual remote CPX was estimated to be $223,873 (purchased equipment) and $148,945 (leased equipment), as shown in Tables 3 and 4. These cost figures assume an actual remote CPX identical to the present simulated exercise.

An actual remote CPX would allow participating units to remain at their home stations, thereby eliminating most of the travel and per diem costs required for the simulated and standard CPXs. It is estimated, however, that as many as 44 controllers from the 75th MAC would still have to travel from Houston, TX, under an actual remote scenario. Approximately 9 would go to each of the Squadron CPs (i.e., Senatobia, MS; Bend, OR; and Pocatello, ID), and approximately 17 would travel to the Regimental CP in Twin Falls, ID. The travel and per diem costs estimated above reflect these projected requirements.

Travel cost estimates were based on commercial air rates in effect at the time of this report. Estimated per diem costs were based on the maximum daily rate allowed at each unit's location ($50 for Senatobia, MS; $61 for Bend, OR; $66 for Pocatello, ID; and $66 for Twin Falls, ID).

Table 3. Actual remote CPX costs with purchased equipment.

Item	Qty	Unit Price	Costs ($) Total
Pay and Allowances			78,609
Per Diem			8,145
Travel			19,060
Subtotal (personnel)			105,814
TV Transceivers	6	12,500	75,000
FAX Machines	5	2,200	11,000
Telephones/ext speakers	23	260	5,980
Addl Telephone Lines	12	100	1,200
Labor			720
Cameras	4	1,000	4,000
Monitors	6	550	3,300
Telephone Network			16,859
Subtotal (equipment)			118,059
Total			223,873

Table 4. Actual remote CPX costs with leased equipment.

Item	Costs ($)
Pay and Allowances	78,609
Per Diem	8,145
Travel	19,060
Subtotal (personnel)	105,814

	Qty	Unit Price	Total
TV Transceivers	6	3,552	21,314
FAX Machines	5	121	608
Telephones/ext speakers	23	740	1,700
Addl Telephone Lines	12	100	1,200
Labor			720
Cameras	4	100	400
Monitors	6	55	330
Telephone Network			16,859
Subtotal (equipment)			43,131
Total			148,945

Telephone network charges were based on AT&T rates for use of the Alliance 1000 teleconferencing system and reflect normal discounts for evening (40%) and night time (56%) use. Appendix D lists the specific assumptions about frequency and kind of usage upon which telephone network costs were computed.

Both lease and purchase costs of communications equipment have been provided assuming that the amount and kind of equipment needed for the actual remote CPX would be identical to that used during the simulated remote CPX. It was also assumed that the same number of additional telephone lines would have to be installed across home-station locations. This assumption was needed to maintain the common baseline for relative cost estimates, even though the real number of additional lines required, if any, will vary from location to location.

DISCUSSION AND CONCLUSIONS

Feasibility

Based on questionnaire responses, the after-action report, and observations by ARI-Boise SCO staff, it can be concluded that an actual remote CPX is technically feasible and that few, if any, job performance problems will result. About half of the soldiers with prior CPX experience reported having no difficulty performing their jobs during the simulated remote exercise as a result of using the special communications equipment provided. Although a substantial percentage did report problems, most of these had to do with the telephones. Because the microphone embedded within the external speaker of each telephone was sound activated, the speaker would cut out when background noise reached a certain level, thereby temporarily disrupting incoming transmissions. This problem could be eliminated in the future by modifying the speaker boxes to include a switch that could be pushed to send and released to receive. This simple "push-to-talk" modification would allow continuous monitoring of network messages, identical to a conference call arrangement, and speaking only when necessary. For such a conference-call-like system to work, however, there must be separate telephone lines for each conference (i.e., radio net), FAX machine, and TV transceiver.

Slow-scan TV increased the speed and accuracy with which graphic and textual information were exchanged during the exercise, and therefore, probably influenced the perceived quality of job performance. The TVs also proved to be extremely reliable despite unfavorable environmental conditions (i.e., outdoor locations, dust, and midday temperatures up to 93 degrees Fahrenheit). Because of limited training time, the TVs were used primarily to exchange images of each unit's maps and overlays. Thus, the full potential of this medium, e.g., concurrent conference call (voice) and TV exchange (image) of charts, graphs, photographs or other briefing materials, was not taken advantage of during this exercise. By ensuring that soldiers are adequately trained in the future on the communications equipment before the start of each remotely conducted CPX, possibly greater performance benefits could be achieved than those perceived from the current CPX.

Facsimile machines can be used effectively to simulate radio Teletype. They are also easy to use, but on the negative side, do not provide practice on actual tactical equipment. The same drawback also pertains to the telephones and slow-scan TV and should be a factor taken into account before deciding to attempt a remotely conducted exercise. Training on the use of tactical equipment could be accomplished outside the context of the exercise.

Lastly, future remote CPXs should place a TV transceiver and FAX machine at the Corps CP (staffed by controllers) to allow normal communication between Corps and Regimental Headquarters. This requirement was not anticipated in the planning of the present exercise.

Cost

The cost data revealed that substantial savings could be achieved by conducting CPXs remotely. Figure 1 depicts the predicted cost per exercise for the standard CPX and the actual remote CPX with both leased and purchased communications equipment. These data show that a remote exercise with leased equipment would be the least expensive (i.e., about $34,000, or 18%, in savings relative to the cost of a standard CPX) if only a single exercise were conducted.

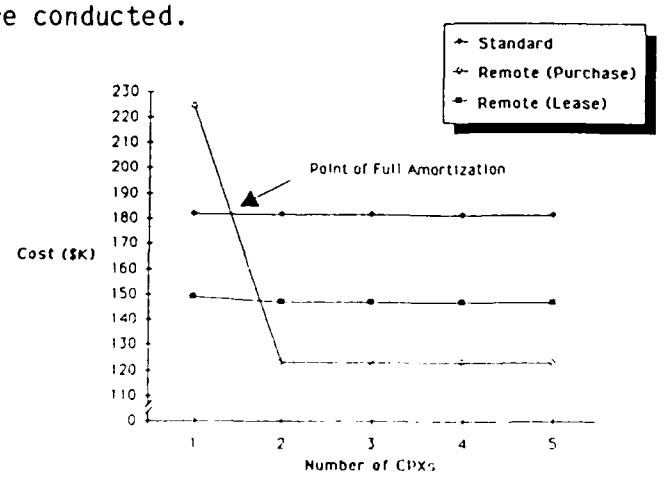

Figure 1. Cost per exercise for standard CPX and actual remote CPX with leased and purchased equipment.

Under a purchase option, the first remote exercise would be more expensive to conduct than the standard exercise because of the initial $101,200 equipment investment (i.e., $118,059 minus $16,859 in recurring telephone network charges). This investment cost could be fully amortized, however, after only two remote exercises. From then on, the cost savings per exercise would be about $57,795, i.e., $182,388 total standard CPX cost minus $124,593 in remote CPX recurring costs, or 32% of the cost of the standard CPX. Because U.S. Army Forces Command (FORSCOM) currently recommends that each battalion or squadron-size unit conduct at least one CPX annually (FORSCOM Regulation 350-2), purchased equipment could be fully amortized during the second year, or sooner if more than one exercise were conducted yearly.

If one decides in favor of a remote scenario, would it be more economical to lease or purchase the communications equipment? Although an exact answer to this question is not possible without knowing the specific terms of future lease agreements and the number of exercises to be conducted over any specific time period, the data shown in Figure 1 demonstrate that, in the case of the present CPX, the lease and purchase options would break even on cost at about the fourth exercise. Thereafter, purchased equipment would provide a relative savings of about $24,000 per exercise, excluding maintenance and repair costs which, of course, must be factored in when known.

In summary, the results of this research suggest that (a) it would be feasible to conduct a remote CAMMS-driven CPX without a perceived loss in job performance or training benefits, (b) the cost of such an exercise can be less than that of a standard CPX, therefore either saving money or providing more exercise opportunities for the same money, and (c) with only minor modifications, off-the-shelf, commercial equipment is available to support long-distance communication requirements.

Although these conclusions technically pertain only to the specific conditions of the present CAMMS-driven CPX, they suggest that a substantial amount of money could be saved (or additional training provided) in the future by applying the concept of remote exercise delivery. This savings will be primarily a direct function of how much travel and per diem costs can be avoided through the use of long-distance communications equipment such as that used here. Savings could be achieved under a remote scenario without having to modify basic exercise materials and without participant resistance to implementation efforts.

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APPENDIX A: Communications Equipment

This appendix includes a description of the specific communications equipment used in the CPX.

Slow-Scan TV

The slow-scan TVs were digital transceivers (Model 285C) leased from Colorado Video, Inc. They transmit and receive digitized color video signals over standard, voice-grade circuits. The video image is provided by any standard video camera, digitized by the 285C, and transmitted by a modem (modulator/demodulator) over the phone line. Dual memories allow two standard T/ frames to be "frozen" prior to transmission. Two levels of screen resolution are available (i.e., high resolution = 512 x 512 x 8 bits per pixel; low resolution = 512 x 256 x 6 bits per pixel). At maximum transmission speed (i.e., 9600 baud), the minimun amount of time required to transmit a single picture at low resolution is 72 sec. with more time required for high resolution transmission. Required peripheral equipment includes a high-speed modem and a specially modified telephone. Also required is a color video camera at each transmission site and a color video monitor at each reception site.

FAX Machines

The facsimile equipment consisted of a variety of Sharp digital transceivers. Each model was capable of transmitting and receiving all types of paper-based documents. These can consist of text, graphics, photographs, or combinations thereof. Two levels of resolution are available with transmission times as short as 20 seconds per page.

Telephones and Speakers

These were standard AT&T touch-tone telephones, model 2500SM, with the optional AT&T loudspeaker attached. The speaker had a built-in, voice (or sound) activated microphone. External to the speaker was a speaker volume control and switch for turning the speaker on and off.

Additional Telephone Lines

These were required to augment the existing system at Gowen Field, Idaho. Twelve additional lines were installed to supplement the existing fourteen off-post lines.

APPENDIX B: Questionnaire Responses

The following is a compilation of questionnaire responses obtained from the 58 soldiers from the 116th ACR who had participated in at least one prior CPX. Because some soldiers failed to answer every question, the total number of responses does not add up to 58 in some cases.

1. Years in the Active Army? Mean: 2.2

2. Years in the National Guard? Mean: 15

3. Years in the 116th ACR? Mean: 10

4. How many past Regimental/Brigade CPXs have you participated in (not including this one)?

# of Past CPXs	# of Respondents	% of Respondents
1-4	27	47
5 or More	31	53

5. How many past CPXs have you participated in as part of the 116th ACR?

# of Past CPXs	# of Respondents	% of Respondents
0	2	3
1-4	33	57
5 or More	23	40

6. Did you participate in the last Regimental CPX (March 1985)?

YES 43 74% NO 15 26%

As part of the current CPX, special equipment has been included to provide the capability to conduct the exercise remotely from different places. This equipment consists of TVs to allow exchange of graphic and textual information, telephones to replace FM Radios, and facsimile machines rather than radio Teletype to provide hard-copy messages.

7. Did you have any difficulties performing your job during this CPX as a result of the equipment (TVs, telephones, and facsimile machines) that was used?

YES 26 45% NO 32 55%

8. Did the use of this equipment enhance your ability to perform your job during this CPX?

YES 28 50% NO 28 50%

9. Compared to the usual method for exchanging graphic and textual information, such as map overlays and messengers, use of TV made my job:

More difficult to perform: 2 10%
Easier to Perform: 18 90%

10. Is TV a reasonable substitute for the normal methods of exchanging graphic and textual information for accomplishment of your job?

YES 18 90% NO 2 10%

11. Compared to FM radios, use of the telephones made my job:

More difficult to perform: 25 49%
Easier to Perform: 26 51%

12. Compared to radio Teletype, use of the facsimile machines made my job:

More difficult to perform: 8 33%
Easier to Perform: 16 67%

13. I would like to have had more training time on the communications equipment before starting the CPX.

YES 30 54% NO 26 46%

14. Do you feel that the communications equipment enhanced, in any way, the training benefit you received from the CPX?

YES 30 54% NO 26 46%

15. If given the option, I would prefer:

(1) Participating in a CPX as it is normally conducted with travel to the training site.

13 25%

(2) Participating in a remotely conducted CPX, similar to this one, while remaining at my home station and using the communications equipment.

40 75%

APPENDIX C: Unit Cost Worksheets for Standard CPX

Included below are the worksheets used to derive expenses incurred by all units participating in the CPX, and definitions for the abbreviations found therein.

P&A	Pay and Allowances.
# INDIV	Number of individuals participating, by grade.
# DAYS	Number of days in a TDY/FTTD status, including travel time.
TVL METHOD	Entries here will be for commercial air transportation (Com Air), military surface transportation (Mil Bus), or privately owned vehicle (POV).
TVL COST	Shown only for commercial air.
PER DIEM	Per diem rate paid for temporary duty (TDY). Paid only for soldiers who travel more than 50 miles from their home station. Boise-Government quarters and meals nonavailable; $69: Boise-Government quarters available, meals nonavailable; $30.

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: Hq and Headquarters Troop, 116th ACR PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
06 COL	174	1	3	$522.00	Mil Bus		$90.30	$612.30
05 LTC	137	2	3	$822.00	Mil Bus		$180.60	$1,002.60
04 MAJ	121	11	3	$3,993.00	Mil Bus		$993.30	$4,986.30
03 CPT	101	6	3	$1,818.00	Mil Bus		$541.80	$2,359.80
02 1LT	81	4	3	$972.00	Mil Bus		$361.20	$1,333.20
01 2LT	67						$0.00	$0.00
							$0.00	$0.00
W4 CW4	105						$0.00	$0.00
W3 CW3	84						$0.00	$0.00
W2 CW2	72						$0.00	$0.00
W1 CW1	61						$0.00	$0.00
Officer Ttl:		24		$8,127.00		0	$2,167.20	$10,294.20
E9 SGM	97	1	3	$291.00	Mil Bus		$90.30	$381.30
E8 MSG	78	5	3	$1,170.00	Mil Bus		$451.50	$1,621.50
E7 SFC	69	3	3	$621.00	Mil Bus		$270.90	$891.90
E6 SSG	59	5	3	$885.00	Mil Bus		$451.50	$1,336.50
E5 SGT	50	11	3	$1,650.00	Mil Bus		$993.30	$2,643.30
E4 CPL	45	10	3	$1,350.00	Mil Bus		$903.00	$2,253.00
E3 PFC	41	7	3	$861.00	Mil Bus		$632.10	$1,493.10
Enlisted Ttl		42		$6,828.00		0	$3,792.60	$10,620.60
TOTALS		66		$14,955.00		0	$5,959.80	$20,914.80

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 1st Sqdn, 108th Cav (116th ACR) PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137	1	3	$411.00	Com Air	$528.00	$90.30	$1,029.30
O4 MAJ	121	2	3	$726.00	Com Air	$1,056.00	$180.60	$1,962.60
O3 CPT	101	9	3	$2,727.00	Com Air	$4,752.00	$812.70	$8,291.70
O2 1LT	81	8	3	$1,944.00	Com Air	$4,224.00	$722.40	$6,890.40
O1 2LT	67	4	3	$804.00	Com Air	$2,112.00	$361.20	$3,277.20
								$0.00
W4 CW4	105	1	3	$315.00	Com Air	$528.00	$90.30	$933.30
W3 CW3	84							$0.00
W2 CW2	72	1	3	$216.00	Com Air	$528.00	$90.30	$834.30
W1 CW1	61							$0.00
Officer Ttl:		26		$7,143.00		$13,728.00	$2,347.80	$23,218.80
E9 SGM	97	1	3	$291.00	Com Air	$528.00	$90.30	$909.30
E8 MSG	78	4	3	$936.00	Com Air	$2,112.00	$361.20	$3,409.20
E7 SFC	69	6	3	$1,242.00	Com Air	$3,168.00	$541.80	$4,951.80
E6 SSG	59	8	3	$1,416.00	Com Air	$4,224.00	$722.40	$6,362.40
E5 SGT	50	9	3	$1,350.00	Com Air	$4,752.00	$812.70	$6,914.70
E4 CPL	45							$0.00
E3 PFC	41	3	3	$369.00	Com Air	$1,584.00	$270.90	$2,223.90
Enlisted Ttl		31		$5,604.00		$16,368.00	$2,799.30	$24,771.30
TOTALS		57		$12,747.00		$30,096.00	$5,147.10	$47,990.10

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 2d Sqdn, 116th ACR PER DIEM: $38.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137	1	3	$411.00	Mil Bus		$90.30	$501.30
O4 MAJ	121	2	3	$726.00	Mil Bus		$180.60	$906.60
O3 CPT	101	12	3	$3,636.00	Mil Bus		$1,083.60	$4,719.60
O2 1LT	81	3	3	$729.00	Mil Bus		$270.90	$999.90
O1 2LT	67	5	3	$1,005.00	Mil Bus		$451.50	$1,456.50
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		23		$6,507.00		$0.00	$2,076.90	$8,583.90
E9 SGM	97	1	3	$291.00	Mil Bus		$90.30	$381.30
E8 MSG	78	3	3	$702.00	Mil Bus		$270.90	$972.90
E7 SFC	69	6	3	$1,242.00	Mil Bus		$541.80	$1,783.80
E6 SSG	59	9	3	$1,593.00	Mil Bus		$812.70	$2,405.70
E5 SGT	50	8	3	$1,200.00	Mil Bus		$722.40	$1,922.40
E4 CPL	45	7	3	$945.00	Mil Bus		$632.10	$1,577.10
E3 PFC	41	2	3	$246.00	Mil Bus		$180.60	$426.60
Enlisted Ttl		36		$6,219.00		$0.00	$3,250.80	$9,469.80
TOTALS		59		$12,726.00		$0.00	$5,327.70	$18,053.70

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 3d Sqdn, 116th ACR PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137	1	3	$411.00	Mil Bus		$90.30	$501.30
O4 MAJ	121	2	3	$726.00	Mil Bus		$180.60	$906.60
O3 CPT	101	9	3	$2,727.00	Mil Bus		$812.70	$3,539.70
O2 1LT	81	4	3	$972.00	Mil Bus		$361.20	$1,333.20
O1 2LT	67	2	3	$402.00	Mil Bus		$180.60	$582.60
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		18		$5,238.00		$0.00	$1,625.40	$6,863.40
E9 SGM	97	1	3	$291.00	Mil Bus		$90.30	$381.30
E8 MSG	78	2	3	$468.00	Mil Bus		$180.60	$648.60
E7 SFC	69	4	3	$828.00	Mil Bus		$361.20	$1,189.20
E6 SSG	59	5	3	$885.00	Mil Bus		$451.50	$1,336.50
E5 SGT	50	6	3	$900.00	Mil Bus		$541.80	$1,441.80
E4 CPL	45	6	3	$810.00	Mil Bus		$541.80	$1,351.80
E3 PFC	41	1	3	$123.00	Mil Bus		$90.30	$213.30
Enlisted Ttl		25		$4,305.00		$0.00	$2,257.50	$6,562.50
TOTALS		43	b	$9,543.00		$0.00	$3,882.90	$13,425.90

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 75th Maneuver Area Cmd (MAC) PER DIEM: $69.00

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174	3	3	$1,566.00	Com Air	$1,776.00	$621.00	$3,963.00
O5 LTC	137	6	3	$2,466.00	Com Air	$3,552.00	$1,242.00	$7,260.00
O4 MAJ	121	21	3	$7,623.00	Com Air	$12,432.00	$4,347.00	$24,402.00
O3 CPT	101	10	3	$3,030.00	Com Air	$5,920.00	$2,070.00	$11,020.00
O2 1LT	81	1	3	$243.00	Com Air	$592.00	$207.00	$1,042.00
O1 2LT	67	2	3	$402.00	Com Air	$1,184.00	$414.00	$2,000.00
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		43		$15,330.00		$25,456.00	$8,901.00	$49,687.00
E9 SGM	97	1	3	$291.00		$592.00	$207.00	$1,090.00
E8 MSG	78	4	3	$936.00	2368	$2,368.00	$828.00	$4,132.00
E7 SFC	69	2	3	$414.00		$1,184.00	$414.00	$2,012.00
E6 SSG	59	2	3	$354.00		$1,184.00	$414.00	$1,952.00
E5 SGT	50	3	3	$450.00		$1,776.00	$621.00	$2,847.00
E4 CPL	45	1	3	$135.00		$592.00	$207.00	$934.00
E3 PFC	41	2	3	$246.00		$1,184.00	$414.00	$1,844.00
Enlisted Ttl		15		$2,826.00		$8,880.00	$3,105.00	$14,811.00
TOTALS		58		$18,156.00		$34,336.00	$12,006.00	$64,498.00

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 129th Eng Co (116th ACR) PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
06 COL	174							$0.00
05 LTC	137							$0.00
04 MAJ	121	1	3	$363.00	Mil Bus		$90.30	$453.30
03 CPT	101	1	3	$303.00	Mil Bus		$90.30	$393.30
02 1LT	81	2	3	$486.00	Mil Bus		$180.60	$666.60
01 2LT	67	2	3	$402.00	Mil Bus		$180.60	$582.60
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		6		$1,554.00		$0.00	$541.80	$2,095.80
E9 SGM	97							$0.00
E8 MSG	78							$0.00
E7 SFC	69	2	3	$414.00	Mil Bus		$180.60	$594.60
E6 SSG	59	5	3	$885.00	Mil Bus		$451.50	$1,336.50
E5 SGT	50	3	3	$450.00	Mil Bus		$270.90	$720.90
E4 CPL	45							$0.00
E3 PFC	41							$0.00
Enlisted Ttl		10		$1,749.00		$0.00	$903.00	$2,652.00
TOTALS		16		$3,303.00		$0.00	$1,444.80	$4,747.80

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 145th S&S Bn / 748th Med Det PER DIEM:

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137							$0.00
O4 MAJ	121	1	3	$363.00	POV			$363.00
O3 CPT	101							$0.00
O2 1LT	81	2	3	$486.00	POV			$486.00
O1 2LT	67							$0.00
								$0.00
W4 CW4	105							$0.00
W3 CW3	84	1	3	$252.00	POV			$252.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		4		$1,101.00		$0.00	$0.00	$1,101.00
E9 SGM	97							$0.00
E8 MSG	78							$0.00
E7 SFC	69	1	3	$207.00	POV			$207.00
E6 SSG	59							$0.00
E5 SGT	50							$0.00
E4 CPL	45							$0.00
E3 PFC	41							$0.00
Enlisted Ttl		1		$207.00		$0.00	$0.00	$207.00
TOTALS		5		$1,308.00		.00	$0.00	$1,308.00

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 110th Weather Det PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
06 COL	174							$0.00
05 LTC	137	1	3	$411.00	Com Air	$414.00	$90.30	$915.30
04 MAJ	121							$0.00
03 CPT	101							$0.00
02 1LT	81	1	3	$243.00	Com Air	$414.00	$90.30	$747.30
01 2LT	67							$0.00
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		2		$654.00		$828.00	$180.60	$1,662.60
E9 SGM	97							$0.00
E8 MSG	78							$0.00
E7 SFC	69							$0.00
E6 SSG	59							$0.00
E5 SGT	50							$0.00
E4 CPL	45							$0.00
E3 PFC	41							$0.00
Enlisted Ttl		0		$0.00		$0.00	$0.00	$0.00
TOTALS		2	6	$654.00		$828.00	$180.60	$1,662.60

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: Atk Hel Co, 116th ACR PER DIEM: $30.10

GRADE	P%A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137							$0.00
O4 MAJ	121	2	3	$726.00	Com Air	$406.00	$180.60	$1,312.60
O3 CPT	101	3	3	$909.00	Com Air	$609.00	$270.90	$1,788.90
O2 1LT	81							$0.00
O1 2LT	67							$0.00
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		5		$1,635.00		$1,015.00	$451.50	$3,101.50
E9 SGM	97							$0.00
E8 MSG	78	1	3	$234.00	Com Air	$203.00	$90.30	$527.30
E7 SFC	69							$0.00
E6 SSG	59							$0.00
E5 SGT	50							$0.00
E4 CPL	45	1	3	$135.00	Com Air	$203.00	$90.30	$428.30
E3 PFC	41							$0.00
Enlisted Ttl		2		$369.00		$406.00	$180.60	$955.60
TOTALS		7		$2,004.00		$1,421.00	$632.10	$4,057.10

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: Air Trp, 116th ACR PER DIEM:

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137							$0.00
O4 MAJ	121	1	3	$363.00	POV			$363.00
O3 CPT	101	1	3	$303.00	POV			$303.00
O2 1LT	81							$0.00
O1 2LT	67							$0.00
								$0.00
W4 CW4	105	1	3	$315.00	POV			$315.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		3		$981.00		$0.00	$0.00	$981.00
E9 SGM	97							$0.00
E8 MSG	78							$0.00
E7 SFC	69	1	3	$207.00	POV			$207.00
E6 SSG	59	1	3	$177.00	POV			$177.00
E5 SGT	50	1	3	$150.00	POV			$150.00
E4 CPL	45							$0.00
E3 PFC	41	1	3	$123.00	POV			$123.00
Enlisted Ttl		4		$657.00		$0.00	$0.00	$657.00
TOTALS		7		$1,638.00		$0.00	$0.00	$1,638.00

TEMPORARY DUTY (TDY) COST WORKSHEET

UNIT: 418th Civil Aff Co PER DIEM: $30.10

GRADE	P&A	# INDIV	# DAYS	P & A	TVL METHOD	TVL COST	PER DIEM	TOTAL
O6 COL	174							$0.00
O5 LTC	137							$0.00
O4 MAJ	121	2	3	$726.00	Com Air	$828.00	$180.60	$1,734.60
O3 CPT	101	2	3	$606.00	Com Air	$828.00	$180.60	$1,614.60
O2 1LT	81	1	3	$243.00	Com Air	$414.00	$90.30	$747.30
O1 2LT	67							$0.00
								$0.00
W4 CW4	105							$0.00
W3 CW3	84							$0.00
W2 CW2	72							$0.00
W1 CW1	61							$0.00
Officer Ttl:		5		$1,575.00		$2,070.00	$451.50	$4,096.50
E9 SGM	97							$0.00
E8 MSG	78							$0.00
E7 SFC	69							$0.00
E6 SSG	59							$0.00
E5 SGT	50							$0.00
E4 CPL	45							$0.00
E3 PFC	41							$0.00
Enlisted Ttl		0		$0.00		$0.00	$0.00	$0.00
TOTALS		5		$1,575.00		$2,070.00	$451.50	$4,096.50

APPENDIX D: Telephone Network Charges

Long distance telephone network charges are based on use of AT&T's Alliance 1000 teleconferencing system. This system allows multiple conference calls from virtually any location within the continental United States (although this is not the only conference network available, it is the most prolific and cost-effective). The rates shown reflect normal discounted rates for evenings (40%) and nights (56%).

Computations were based on the following assumptions which were also in place during the simulated remote exercise:

1. All FM radio nets are to be simulated by a long-distance conference call.

    a. Conference calls would be open for use on Friday from 1800-2400, on Saturday from 0500-2400, and on Sunday from 0500-1100 hours.

    b. Corps HQ will operate 2 radio nets to Regiment; 1 conference call and 1 dial-up.

    c. Regiment will operate 4 radio nets to each Squadron; each as a separate conference call.

2. Slow-scan TV and FAX machines will operate on separate dial-up lines.

    a. Slow-scan TV will use a maximum of three, 3-minute calls each hour.

    b. FAX machines will use a maximum of two, 6-minute calls each hour.